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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.         | CONFIRMATION NO. |
|--|-------------|----------------------|-----------------------------|------------------|
| 10/533,998   | 05/04/2005  | Jin Jang             | WELLT-014PUS                | 2592             |
| 22494 7590 11/29/2007<br>DALY, CROWLEY, MOFFORD & DURKEE, LLP<br>SUITE 301A<br>354A TURNPIKE STREET<br>CANTON, MA 02021-2714 |             |                      | EXAMINER<br>BOMKAMP, ERIC A |                  |
|  |             |                      | ART UNIT                    | PAPER NUMBER     |
|  |             |                      | 2826                        |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/533,998

Applicant(s)

JANG ET AL.

Examiner

Eric A. Bomkamp

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.


- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 22-26, 28, 30, 32 is/are rejected.
- 7) ☒ Claim(s) 21, 27, 29, 31 and 33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

  
Minhloan Tran  
Primary Examiner  
Art Unit 2826

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 10-27-05, 6-23-05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

1. Claims 27, 29, 31, 33 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim 8. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-7, 9-20, 22, 24-26, 28, 30, and 32 are rejected under 35 U.S.C. 102 (b) as being anticipated by Zhang et al., 6,124,155
4. With respect to claim 1, Zhang et al. show a phase transition method of an amorphous material, comprising steps of: depositing the amorphous material (5) on a dielectric substrate (1); forming a cap layer (4) on the amorphous material; depositing a metal (3) on the cap layer; and performing a phase transition on the amorphous material (Fig. 1c, column 3, lines 56-67, and column 4, lines 1-34).
5. With respect to claim 2, Zhang shows the method further comprises a step of depositing a buffer layer (2) before the step of depositing the amorphous material on the dielectric substrate (Fig. 1c, column 3, lines 56-67, and column 4, lines 1-34).

6. With respect to claim 3, Zhang shows the method further comprises a step of performing preliminary thermal treatment before the step of performing a phase transition on the amorphous material (Column 6, lines 6-21).

7. With respect to claim 5, Zhang shows the method further comprises a step of patterning the thermally-treated film after the step of performing preliminary thermal treatment before the step of performing a phase transition on the amorphous material (column 6, lines 6-21) (Fig. 3a-h show the process that forms the device of Fig. 1a. However, Zhang discloses that Fig. 1c is the reverse structure of Fig. 1a, and it can be inferred that the same processes were used to arrive at the structure of Fig. 1c. It follows that a thermal process would have been used on the structure of Fig. 1c to obtain the substrate).

8. With respect to claim 6, Zhang shows the method further comprises a step of depositing a second cap layer (13) on the metal (3), and a step of patterning the stack structure after the step of depositing the metal before the step of performing a phase transition on the amorphous material (Fig. 1c shows the laser radiation (phase transition step) being performed on a finished structure. Fig. 1c, then, must have been patterned after depositing the metal but before performing radiation. See Fig. 3a-h for the detailed process of the similar structure in Fig. 1a).

9. With respect to claim 7, Zhang shows a phase transition method of an amorphous material, comprising steps of: depositing a metal (3) on a dielectric substrate (1); forming a buffer or cap layer on the metal (4); depositing the amorphous material on the buffer or cap layer (5); and performing a phase transition on the amorphous material (Fig. 1a, column 2, lines 34-67 and column 3, lines 1-23).

10. With respect to claim 9, Zhang shows the dielectric material is glass (column 3, lines 9-12).

11. With respect to claim 10, Zhang shows the amorphous material is an amorphous silicon (column 4, lines 5-9).

12. With respect to claim 11, Zhang shows the cap layer (4) is a single film comprising a silicon oxide film (column 4, lines 16-34).

13. With respect to claim 12, Zhang, Fig. 1c, shows the cap layer comprises a first part having a thin thickness (4) and a second part having a thick thickness (13) (Column 4, lines 16-65, teaches that layer 4 and layer 13 are made of silicon dioxide).

14. With respect to claim 13, Zhang shows a lower portion of the second part (13) is made up of the same material as that of the first part (4) (column 4, lines 16-65).

15. With respect to claim 14, Zhang shows an upper portion of the second part (13) is made up of the same material as the first part (4) (column 2, lines 16-65).

16. With respect to claim 15, Zhang shows the cap layer (4) is deposited by a PECVD method (Column 6, lines 63-67).

17. With respect to claim 16, Zhang shows the deposition of the amorphous material is performed at a temperature of 650 °C or less (column 6, lines 51-63).

18. With respect to claim 17, Zhang shows the thickness of the cap layer is in a range of 0.1 to 1000nm (column 6, lines 33-43).

19. With respect to claim 18, Zhang shows the thickness of the second cap layer is in a range of 0.1 to 1000nm (column 6, lines 33-43).

20. With respect to claim 19, Zhang shows the deposition of the metal is performed by a sputter method (column 6, lines 22-32).
21. With respect to claim 20, Zhang shows the metal is partially patterned by using one selected from a photolithography, a photoresist, and a shadow mask (a photomask is disclosed, which is part of the photolithography process (column 6, lines 22-32).
22. With respect to claim 22, Zhang shows the metal is deposited to have a thickness of 1000nm or less (column 6, lines 22-32).
23. With respect to claim 24, Zhang shows the buffer layer (2) is a silicon oxide film (column 4, lines 16-22).
24. With respect to claim 25, Zhang shows the preliminary thermal treatment is performed at a temperature of 200 to 800 degrees C (column 6, lines 6-21).
25. With respect to claim 26, Zhang shows the phase transition of the amorphous material is performed by a laser illumination method (column 6, lines 43-50).
26. With respect to claim 28, Zhang shows the thermal treatment is performed at a temperature of 400 degrees C (Column 7, lines 31-56).
27. With respect to claim 30, Zhang shows the thermal treatment is performed an ultraviolet lamp (the reference discloses the use of a KrF laser emitting a ray with an ultraviolet wavelength of 248nm, column 7, lines 35-43).
28. With respect to claim 32, Zhang shows an electric field or a magnet field is applied in the thermal treatment process (the laser illumination method described is a type of electric field column 6, lines 43-50).

***Claim Rejections - 35 USC § 103***

29. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

30. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

31. Claims 4, 8, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al..

32. With respect to claim 4, Zhang fails to show the method further comprises a step of removing the metal and the cap layer after the step of performing a phase transition on the amorphous material.

However, Zhang does show that the metal and cap layer are patterned/removed (Fig. 1c). Although the reference shows this step being performed before the phase transition, one of ordinary skill in the art would know that the removal step could also be performed after the phase transition. It is thought that there are no advantages as to when the metal layer and cap layer are removed. It would have been obvious to one of ordinary skill in the art at the time the

invention was made to remove the metal and cap layer after the phase transition because end result is identical to Zhang's device. Merely changing the order of operation does not constitute a patentable method when it provides an identical result and has no other advantages (i.e. saves time).

33. With respect to claim 8, Zhang fails to show the method further comprises a step of performing a secondary phase transition on the phase-transitioned material after the step of performing the phase transition on the amorphous material.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform a second phase transition on the amorphous material because it would further crystallize the material and improve the device characteristics.

34. With respect to claim 23, Zhang fails to explicitly show the metal is nickel.

However it would have been obvious to one of ordinary skill in the art at the time the invention was made to use nickel as the metal because it is a well known metal material in the art.

***Allowable Subject Matter***

35. Claim 21 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record does not teach nor suggest the use of a metal having a surface density in the range of  $10^{12}$  to  $10^{18}$  cm<sup>-2</sup>.



*Conclusion*

36. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. 2005/0157630, 2005/0237912, 2005/0267230, 2006/0072442, 2007/0032049, 2007/0032054.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric A. Bomkamp whose telephone number is 571-270-1559. The examiner can normally be reached on Monday thru Friday 8:00AM-5:00PM E.S.T..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached at 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.